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[Title Of The Invention]

JIG FOR MANUFACTURING BASE WITH TERMINAL

[Abstract]

PROBLEM TO BE SOLVED: To provide a jig for manufacturing a base with a terminal capable of surely manufacturing the base with the terminal with high reliability.

SOLUTION: A jig 31 has an alignment surface 33a, which is formed with several recessed parts 37 for inserting each of terminals 16 therein. Joining ends 16a of the terminals 16 are retained in a state wherein they are floated on the alignment surface 33a. The amount of float is sufficient to form at least a complete fillet. After such alignment process, a base 2 is superposed on the jig 31, and moreover a brazing material S1 is melted. As a result, a conductor portion 4 and the terminal 16 are brazed to manufacture a base with a terminal.

[Claim(s)]

[Claim 1] A process of piling up said substrate on said jig in order to contact a process aligned where two or more terminals are stood using a jig, and a conductor part formed in a substrate to a jointing end of each of said terminal which aligned, And it is said jig used in a manufacturing method of a substrate with a terminal including a process of soldering said conductor part and said terminal by carrying out melting of the wax material which intervenes between said conductor part and said jointing end, A jig for the substrate manufacture with a terminal after the jig has the lined surface in which two or more crevices for inserting said each terminal were formed and only quantity by which a perfect fillet is formed at least and in which it deals from the lined surface has floated, wherein a jointing end of each of said terminal is held.

[Claim 2] The jig for the substrate manufacture with a terminal according to claim 1 consisting of heat-resistant material and having a cave in the inside.

[Claim 3] It is the jig for the substrate manufacture with a terminal of said both jigs according to claim 1 or 2 provided in either at least about a positioning fix mechanism for carrying out the positioning fix of both the jigs to separation impossible, when making a mutual lined surface counter using said two jigs and arranging.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the jig used when manufacturing a substrate with a terminal.

[0002]

[Description of the Prior Art] In recent years, some manufacturing methods of the substrate with a terminal which joins two or more pins with soldering to the pad formed in one side or both sides of a substrate are proposed. In that case, the thing which made two or more pins hold by an aligned state may be used, for example for a sheet-shaped spacing tool. However, depending on the kind of pin, parts may be unable to be supplied in such the state. Therefore, to align the pin supplied in the scattering state using a jig for exclusive

use is needed. An example of the manufacturing method of the substrate with a terminal in such a case is explained based on drawing 10 - drawing 12.

[0003]First, the jig 81 for alignment which equips the lined surface 82 with two or more crevices 83 is prepared. The non-jointing end 84b side of the pin 84 is inserted in the crevice 83 of this jig 81, and the lined surface 82 is turned to the upper part for the jointing end 84a side. Next, the substrate 87 with which the cream solder 86 is beforehand printed by the pad 85 is prepared, and it is piled up on the jig 81. Each jointing end 84a is then contacted to each pad 85. Next, each pin 84 moves to the jig 88 for reflows said substrate 87 by which temporary fastening is carried out, and sets the whole jig 88 in a reflow furnace. And the substrate with a terminal was manufactured by heating to the temperature which the solder S1 fuses, and soldering each pad 85 and each pin 84.

[0004]

[Problem(s) to be Solved by the Invention]However, in conventional technology, since it will almost be buried in the jigs 81 and 88 by the pin 84 (drawing 11, drawing 12), the solder S1 fused by a reflow cannot fully turn around it. Therefore, there was a problem that an imperfect-shaped fillet was easy to be formed. Therefore, the bonding strength of the pad 85 and the pin 84 becomes weak, and high reliability was hard to be secured.

[0005]Made in order that this invention may solve the above-mentioned technical problem, the purpose is to provide the jig for the substrate manufacture with a terminal which can manufacture a reliable substrate with a terminal certainly.

[0006]

[Means for Solving the Problem]In order to solve the above-mentioned technical problem, in the invention according to claim 1. A process of piling up said substrate on said jig in order to contact a process aligned where two or more terminals are stood using a jig, and a conductor part formed in a substrate to a jointing end of each of said terminal which aligned, And it is said jig used in a manufacturing method of a substrate with a terminal including a process of soldering said conductor part and said terminal by carrying out melting of the wax material which intervenes between said conductor part and said jointing end, The jig has the lined surface in which two or more crevices for inserting said each terminal were formed, and a jointing end of each of said terminal makes the gist a jig for the substrate manufacture with a terminal holding after only quantity by which a perfect fillet is formed at least, and in which it deals from the lined surface has floated.

[0007]In claim 1, the invention according to claim 2 consisted of heat-resistant material, and presupposed that it has a cave in the inside. In the invention according to claim 3, in claim 1 or 2, when making a mutual lined surface counter using said two jigs and having arranged, a positioning fix mechanism for carrying out the positioning fix of both the jigs to separation impossible was made into a thing of said both jigs provided in either at least.

[0008]Hereafter, "OPERATION" of this invention is explained. According to the invention according to claim 1, by inserting a terminal in two or more crevices, after each terminal has stood, it aligns. Since a jointing end of a terminal will be floated from a lined surface of a jig for alignment by only quantity by which a perfect fillet is formed and in which it deals at this time, it can fully turn around wax material fused on the occasion of a soldering process, without being interfered by lined surface. Therefore, a perfect fillet is certainly formed between a conductor part and a terminal. Therefore, bonding strength between a conductor part and a terminal becomes strong, and high reliability is secured to a substrate with a terminal.

[0009]According to the invention according to claim 2, it can use that it is the material which has heat resistance also as a jig for soldering not only as a jig for alignment. Therefore, transfer operation of a jig becomes unnecessary and working efficiency of the part improves. If an inside has a cave, it will be easy to become hot by reduction in calorific capacity as a whole, and will become easy to cool down. Therefore, time which soldering takes can be shortened and working efficiency of the part improves.

[0010]According to the invention according to claim 3, even when reversing both jigs in the state where made it counter for example and it has arranged with a positioning fix mechanism from the positioning fix of both the jigs being carried out to separation impossible, a gap of both jigs is prevented. Therefore, a double-sided package soldering process can be performed certainly, and improvement in working efficiency can be aimed at along with it.

[0011]

[Embodiment of the Invention]

[A 1st embodiment] The manufacturing method using the conversion module and jig of Embodiment 1 which materialized this invention is hereafter explained in detail based on drawing 1 - drawing 5.

[0012]First, the structure of the conversion module 1 as a substrate with a terminal is explained. As shown in drawing 1 - drawing 3, the conversion module 1 of this embodiment which consists only of the conversion board 2 is because it carries in the mother board MB, after carrying out signal transformation of PGA21 as a semiconductor package.

[0013]The double-sided boards 14 which constitute the main part of the conversion board 2 are rectangular shape and a rigid thing, and are carrying out the two-layer owner of the conductor layer to rear surface both sides. The 1st pad 5, 2nd pad 4, circuit pattern 6, and mini viahole 8 are formed in the 1st field of the double-sided board 14. On the other hand, the pads 9 and 10 for electronic-parts connection which carried out rectangular shape are formed in the 2nd field of the double-sided board 14 which extended in the transverse direction, respectively. It is for the pad 9 carrying out the surface mount of DIP(dual inline package) 11. It is for the pad 10 carrying out the surface mount of the chip resistor 12. Said pad 10 is formed also in the undersurface side of the double-sided board 14. Chip resistor 12 and DIP11 receives the corresponding pads 9 and 10, and the gap is also joined via the solder S1.

[0014]As shown in drawing 3, the circuit pattern 6 in the surface of this double-sided board 14 has electrically connected the 1st and 2nd pads 4 and 5 and the land of the mini viahole 8. In addition, a certain thing (graphic display abbreviation) of the circuit patterns has electrically connected between the pads 4 and 5 and the electronic parts 11 and 12 or between the electronic parts 11 and 12 comrades.

[0015]As shown in drawing 3, the 2nd pad 4 as the 2nd conductor part is formed in the surface side of the double-sided board 14, and the 1st pad 5 as the 1st conductor part is formed in the rear-face side of the double-sided board 14. Both the pads 4 and 5 that are conductor parts are circle configurations, and are arranged alternately. Said both pads 4 and 5 are formed in the physical relationship which overlaps when the double-sided board 14 is projected on a thickness direction. The solder resist 17 which has the opening 17a is formed in the prescribed spot at the surface of the double-sided board 14. The pads 4 and 5 are exposed from the opening 17a except for a peripheral part. That is, the diameter D5

(this embodiment 1.1 mm) of both the pads 4 and 5 is larger than the diameter D4 (this embodiment 1.0 mm) of the opening 17a. It is because the pads 4 and 5 will become difficult to exfoliate if it does in this way. The pads 9 and 10 for said electronic-parts connection are also exposed from the opening 17a. It does not expose from the solder resist 17, but the land of the circuit pattern 6 and the mini viahole 8 is protected by the solder resist 17.

[0016]As shown in drawing 3 etc., the surface mount of many negative-form socket-like pins 15 as the 2nd terminal is carried out to the surface side of this double-sided board 14. On the other hand, the surface mount of many male type pins 16 as the 1st terminal is carried out to the rear-face side. The number of both the pins 15 and 16 is [200 pieces -] about 500 in this embodiment. The negative-form socket-like pin 15 is an approximately cylindrical member, and the insert hole 15a is formed in the apical surface. The I/O pin 24 which projects from the undersurface of PGA21 is fitted in the insert hole 15a of the negative-form socket-like pin 15 so that insert and remove are possible. If easy [the insert and remove of the I/O pin 24], in order to close, the taper part 15b is formed at the tip of the negative-form socket-like pin 15. This taper part 15b has spread, so that it goes to the tip side. The end face side of the negative-form socket-like pin 15 is soldered to the 2nd pad 4. And the perfect fillet is formed in the base end peripheral surface of the negative-form socket-like pin 15, and the surface of the pad 4 with the solder S1.

[0017]As shown in drawing 3 etc., each male type pin 16 is formed in the shape of a nail heading. It is because bonding strength of adopted [this shape] improves since the slip off stop of the mold pin 16 which keeps having the nail heading part 16a in the end face side is planned, and high reliability is secured by extension. Said nail heading part 16a is soldered to the 1st pad 5. As a result, the perfect fillet is formed in the base end peripheral surface of the male type pin 16, and the surface of the pad 5 with the solder S1. It is preferred that the diameter D3 of the nail heading part 16a is smaller than the diameter D4 of the opening 17a of the solder resist 17 (refer to drawing 5). The reason is forming a perfect fillet in a joining section certainly, and is for obtaining high bonding strength. Specifically in this embodiment, the diameter D4 of 0.7 mm and the opening 17a is set as 1.0 mm for the diameter D3 of the nail heading part 16a. In the male type pin 16, the overall length L1 of 0.45 mm and the male type pin 16 is set [the length L4 of the nail heading part 16a / the length L5 of the shank 16b of 0.2 mm and the male type pin 16] as 5.7 mm for the diameter D2 of 5.5 mm and the shank 16b. It is preferred that the diameter of the base end of the negative-form socket-like pin 15 is also smaller than the diameter D4 of the opening 17a of the solder resist 17 by the same reason as the above.

[0018]As shown in drawing 3, the mini viahole 8 is formed so that the rear surface of the double-sided board 14 may be penetrated. Thereby, the conductor layer (circuit pattern 6 grade) in the surface side of the double-sided board 14 and the conductor layer (circuit pattern 6 grade) in the rear-face side of the double-sided board 14 have flowed. Here, in the mini viahole 8, rather than the usual viahole (0.4 mm - 0.8 mm in diameter) aiming at pin fit-in, it is a byway and the thing aiming only at aiming at the flow of a rear surface is pointed out. In this embodiment, the mini viahole 8 about 200 micrometers in diameter is specifically formed.

[0019]As shown in drawing 1, the fixed socket 25 is being beforehand fixed to the mother board MB by desorption impossible with soldering. The fixed socket 25 is provided with many negative-form socket-like pins 26. At the time of use, the male type pin 16 with

which said conversion module 1 is provided is fitted in the insert hole of these fixed sockets 25 so that insert and remove are possible. In order to give the facilities at the time of performing a parts replacement, soldering is not made in the connection part concerned. [0020]On the other hand, PGA21 which is a semiconductor package is carried in the upper surface side of the double-sided board 14. At this time, the I/O pin 24 of PGA21 is fitted in the insert hole 15a of the negative-form socket-like pin 15 so that insert and remove are possible. And the PGA21 and mother board MB side is electrically connected via the conversion module 1 at this time. Therefore, signals become possible [going back and forth between PGA21 and the mother boards MB]. In that case, when a signal etc. are suitably changed by the electronic parts 11 and 12 of the double-sided board 14, the original function of PGA21 will be in the state where it is fully demonstrated.

[0021]Next, the structure of the jig 31 for alignment used in manufacture of the above conversion modules 1 is explained. As shown in drawing 4, this jig 31 for alignment consists of two or more members. That is, this jig 31 for alignment consists of the piece 32 of a lower jig, the piece 33 of an inside jig, the piece 34 of an upper jig, and the piece 35 for positioning fixes of a jig. The piece 33 of an inside jig is arranged at separation impossible at the upper surface side of the piece 32 of a lower jig. The piece 34 of an upper jig is arranged disengageable at the upper surface side of the piece 33 of an inside jig. The piece 35 for positioning fixes of a jig is arranged removable at the upper surface side of the piece 33 of an inside jig at the time of removal of the piece 34 of an upper jig.

[0022]As for the piece 32 of a lower jig, the piece 33 of an inside jig, and the piece 35 for positioning fixes of a jig, it is preferred that each consists of heat-resistant material. This is because it can be used also as a jig for reflows not only as the jig 31 for alignment if it has heat resistance. Speaking concretely, by this embodiment, using metallic materials, such as aluminum and stainless steel. They may be ceramics materials, such as alumimium nitride, alumina, silicon nitride, and silicon carbide.

[0023]As for the piece 32 of a lower jig, and the piece 33 of an inside jig, it is preferred to have the cave 36 in the inside, respectively. It is because it is easy to become hot by reduction in calorific capacity as a whole, and it becomes easy to cool down, so the time which a reflow takes can be shortened and it will lead to improvement in working efficiency by extension, if the reason has the cave 36.

[0024]Two or more crevices 37 for inserting each male type pin 16 are formed in two or more [in the upper surface (namely, lined surface 33a) of the piece 33 of an inside jig]. This crevice 37 has the shape for example, of a round cross section. The inside diameter D1 of the crevice 37 is set up more greatly than the diameter D2 of the shank 16b of the male type pin 16, and is set up smaller than the diameter D3 of the nail heading part 16a of the male type pin 16. The depth L3 of this crevice 37 needs to be formed shorter than the overall length L1 (the passage of here above-mentioned 5.7 mm) of the male type pin 16. Therefore, when the male type pin 16 is inserted in the crevice 37, the jointing end side of the male type pin 16 projects from the crevice 37 by L2 (and when there is no piece 34 of an upper jig). That is, the nail heading part 16a in a jointing end will be in the state where it floated from the lined surface 33a.

[0025]In this case, the nail heading part 16a of each male type pin 16 needs to be held after only the quantity L2 by which a perfect fillet is formed at least and in which it deals from the lined surface 33a has floated (floating [=] quantity L2). A perfect fillet refers to the fillet which was not crushed as shown in drawing 5, but carried out the shape of foot.

According to the figure, the solder S1 fused by a reflow has fully wrapped in thoroughly the surroundings lump and the nail heading part 16a. In the case of this embodiment, the height from the pars basilaris ossis occipitalis of a perfect fillet to a crowning is set to about 0.5 mm. It follows and there is said necessity that it floats and the quantity L2 is more than this value at least. the case the height of the perfect fillet which should be formed being about 0.5 mm speaking concretely, -- said -- it floats, and as for the quantity L2, 0.6 mm - 5.0 mm are good, 1.0 mm - its 3.0 mm are still better, and 1.5 mm - especially its 2.0 mm are good. However, since the depth L3 of the crevice 37 will become shallow if it floats and the quantity L2 becomes long too much, it becomes difficult to carry out positioning and there is a possibility of becoming easy to produce a position gap. Therefore, in this embodiment, it is set as $L2 = 1.5\text{mm}$ and $L3 = 4.2\text{mm}$. As for the quantity L2, when it has another way of speaking, it floats and it is good that it is $1/2$ or less [of the overall length L1 of the male type pin 16]. It is in the tendency which also shifts the optimum range of L2 to a big value along with it when the height of a perfect fillet becomes larger than 0.5 mm, and the optimum range of L2 also shifts to a small value along with it in becoming conversely smaller than 0.5 mm.

[0026]The tapered shape breakthrough 38 is formed in the part corresponding to said crevice 37 in the piece 34 of an upper jig. These breakthroughs 38 have spread toward the upper surface side, and the overall diameter is larger than the diameter D3 of the nail heading part 16a. Therefore, the male type pin 16 supplied in the scattering state is smoothly guided into the crevice 37, when there are these breakthroughs 38. At this time, the male type pin 16 will be in the state where the nail heading part 16a turned to the top.

[0027]The piece 35 for positioning fixes of a jig is a member of the frame shape which made the same size the conversion board 2 mostly. The cave 36 may be formed in the piece 35 for positioning fixes of a jig. The step 39 of the rectangular shape for carrying out the positioning fix of the conversion board 2 in the state where it fitted in is formed in the inner skin side of the piece 35 for positioning fixes of a jig. If the conversion board 2 is fitted into this piece 35 for positioning fixes of a jig, the conversion board 2 will separate a fixed interval from the lined surface 33a, and will be supported horizontally. That is, this piece 35 for positioning fixes of a jig has a role of a spacer.

[0028]The piece 35 for homotopic arrangement immobilization of a jig is provided with the guide part 40. This guide part 40 fits in the conversion board 2 being guided. As a result, the conversion board 2 will be in an unmovable state horizontally, and a positioning fix will be planned. That is, this piece 35 of a positioning fix jig also has a role of a guide.

[0029]Next, how to manufacture this conversion module 1 is explained based on drawing 4(a) - drawing 4(e). First, copper clad laminate which stuck copper foil on both sides of a glass epoxy insulating substrate is made into the charge of a start material, and copper foil is etched after forming resist. As a result, the pads 4, 5, 9, and 10 and the circuit pattern 6 are formed in insulating-substrate both sides. Subsequently, the breakthrough (about 200 micrometers in diameter) for forming the mini viahole 8 is punctured using a drill etc. The mini viahole 8 is formed by performing non-electrolytic copper plating, after giving a catalyst core. Then, the solder resist 17 is formed in insulating-substrate both sides. It may replace with the insulating substrate made from glass epoxy, and the insulating substrate made from glass polyimide may be chosen.

[0030]In the 1st continuing solder presswork, single side printing of the cream solder 18 is beforehand carried out on the 1st pad 5 in the 1st field side with the technique of screen-

stencil. Printing of the cream solder 18 may be made by techniques other than screen-stencil. As the cream solder 18, the thing etc. which make a vehicle come to distribute the powder of the eutectic crystal solder (Pb:Sn=37:63, melting point of 183 **) S1 for example are used.

[0031]In the following process, the nail heading part 16a of the male type pin 16 which is the 1st terminal is aligned in the state where it floated from the lined surface 33a of the jig 31 for alignment (male type pin alignment process). Specifically, it is based on the following procedures. First, the male type pin 16 is supplied from the upper part in the scattering state to the jig 31 for alignment which attached the piece 34 of an upper jig. It is good then to make the jig 31 for alignment rock horizontally. If it does in this way, the shank 16b of the male type pin 16 enters in the crevice 37, and it will be in the state where the male type pin 16 stood (refer to drawing 4 (a)). Next, the piece 34 of an upper jig is removed (refer to drawing 4 (b)). Then, it will be in the state where the nail heading part 16a of the male type pin 16 lost touch with the lined surface 33a of the jig 31 for alignment. Then, the piece 35 for positioning fixes of a jig is arranged on the piece 33 of an inside jig.

[0032]In the following conversion board superposition process, the conversion board 2 is piled up on the jig 31 for alignment in order to make the end face of the nail heading part 16a of the mold pin 16 which aligned and pushes the 1st pad 5 by the side of the 1st field contact (refer to drawing 4 (c)). That is, the step 39 of the piece 35 of a positioning fix jig is made to support the conversion board 2. At this time, the guide part 40 of the piece 35 of a positioning fix jig fits in, the conversion board 2 being guided. Since the cream solder 18 is printed on each pad 5, temporary fastening of the nail heading part 16a of the male type pin 16 is carried out by the adhesive power to the pad 5.

[0033]In the 2nd following solder presswork, the solder S1 as wax material is screen-stenciled in the state of the solder cream 18 to the 2nd pad 5 in the 2nd field side in the conversion board 2 (refer to drawing 4 (d)). Since many male type pins 16 exist in the 1st field side in the conversion board 2 at this time, so to speak, the conversion board 2 is supported in many points. Therefore, since the printing pressure will be distributed by each male type pin 16 even when the cream solder 18 is printed to the pad 4 by the side of the 2nd field, it is avoided that printing pressure concentrates on one place.

[0034]In the following process, the jointing end of the negative-form socket-like pin 15 is contacted to the 2nd pad 4 in the 2nd [of the conversion board 2] field side. At this embodiment, where the negative-form socket-like pin 15 is held with the spacing tool 19 made of a sheet shaped and resin, it supplies.

[0035]In the following double-sided package reflow process, a reflow is performed by heating the conversion board 2 the whole jig 31 for alignment, and melting of the cream solder 18 is carried out (refer to drawing 4 (e)). As a result, the mold pin 16 which the 1st lets pass pad 5 is soldered, and the 2nd pad 4 and the negative-form socket-like pin 15 are soldered.

[0036]Then, the desired conversion module 1 is completed by soldering the electronic parts 11 and 12 individually to each pad 9 and 10. The cream solder 18 is printed also to the pads 9 and 10 for electronic-parts connection, and it may solder to them simultaneously with negative-form socket-like pin 15 grade in said double-sided package reflow process.

[0037]Thus, if what carries PGA21 in the produced conversion module 1 is carried in the

fixed socket 25 of the mother board MB, PGA21 can be operated at high speed.

[0038]Now, in this embodiment, characteristic operation effects are enumerated below.

(b) As for the conversion module 1 manufactured using the jig 31 for alignment of this embodiment, the conversion board 2 consists of the double-sided board 14. For this reason, compared with the conventional thing which consists of multilayer boards, composition becomes simple certainly. Since it is not necessary to form the usual viahole which is an object for pin fit-in and formation of only the mini viahole 8 for a rear surface flow is sufficient, composition becomes simple also by this. Therefore, it can be considered as the low cost conversion module 1 from the above two things. The outside dimension of the double-sided board 14 which constitutes the main part of the conversion board 2 from formation of the viahole for pin fit-in becoming unnecessary can be made small. For this reason, the compact conversion module 1 can be obtained.

[0039]According to the jig 31 for alignment of this embodiment, by inserting the male type pin 16 in two or more crevices 37, after each male type pin 16 has stood, align. The nail heading part 16a of the male type pin 16 will be floated from the lined surface 33a of the jig 31 for alignment by only the quantity L2 by which a perfect fillet is formed and in which it deals at this time. Therefore, it can fully be turned around the solder S1 fused on the occasion of a soldering process to the nail heading part 16a bottom, without being interfered by the lined surface 33a. Therefore, a perfect fillet is certainly formed between the mold pins 16 which the 1st lets pass pad 5. Therefore, the bonding strength between the mold pins 16 which the 1st lets pass pad 5 becomes strong, and high reliability can be secured to the conversion module 1.

[0040]Since the jig 31 for alignment of this embodiment is what consists of material which has heat resistance, it can be used also as a jig for reflows not only as a jig for alignment. Therefore, the transfer operation of the jig before a soldering process becomes unnecessary, and working efficiency of the part improves. Since there is the cave 36 in the inside of this jig 31 for alignment, it is easy to become hot by reduction in calorific capacity as a whole, and becomes easy to cool down. Therefore, the time which a reflow process takes can be shortened and working efficiency of the part improves.

[A 2nd embodiment] Next, the manufacturing method of the conversion module 1 of a 2nd embodiment that materialized this invention is explained in detail based on drawing 6.

[0041]Here, in addition to the jig 31 for alignment of said embodiment, it differs in that the jig 41 for one more alignment is used. The former is called after this the 1st jig 31 for alignment, and the latter is called the 2nd jig 41 for alignment.

[0042]As shown in drawing 6 (b) etc., the 2nd jig 41 for alignment consists of the piece 42 of a lower jig, and the piece 44 of an upper jig. The crevice 43 is formed in two or more places of the piece 42 of a lower jig. On the other hand, similarly in the piece 44 of an upper jig, the crevice 45 is formed in the part corresponding to the crevice 43. The opening of each crevice 45 is carried out in the upper surface which is the lined surface 44a. In the crevice 43 formed in the piece 42 of a lower jig, the jointing end side of the negative-form socket-like pin 15 is accommodated. In the crevice 45 formed in the piece 44 of an upper jig, the non-jointing end side of the negative-form socket-like pin 15 is accommodated. Therefore, the way of the inside diameter of the crevice 45 is formed more greatly than the inside diameter of the crevice 43. The cave 36 may be formed about this piece 42 of a lower jig and piece 44 of an upper jig.

[0043]By the first process, the jointing end of the negative-form socket-like pin 15 which

is the 2nd terminal is first aligned according to drawing 6(a) - drawing 6(d) in the state where it floated from the lined surface 44a of the 2nd jig 41 for alignment. Speaking more concretely, becoming the following procedure. The negative-form socket-like pin 15 of a scattering state is supplied from the upper part of the piece 42 of a lower jig, and the non-jointing end side is made to enter in the crevice 43 (refer to drawing 6(a)). At this time, each negative-form socket-like pin 15 will be in the state where it stood. Next, while piling up the piece 44 of an upper jig on the piece 42 of a lower jig (refer to drawing 6(b)), after reversing them (refer to drawing 6(c)), only the piece 42 of a lower jig is removed (refer to drawing 6(d)).

[0044]On the other hand, according to the procedure shown in Embodiment 1, the 1st solder presswork, a male type pin alignment process, a conversion board superposition process, and 2nd solder presswork are carried out, and it changes into a state like drawing 6(e).

[0045]In the following reversal process, the conversion board 2 is reversed the whole jig [the] 31 for alignment, and they are laid on top of the 2nd jig 41 for alignment in order to contact the 2nd pad 4 to the jointing end of the negative-form socket-like pin 15 (refer to drawing 6(f)). At this time, the lined surfaces 33a and 44a of the two jigs 31 and 41 for alignment will be in the state where it countered mutually. The piece 46 for positioning fixes of this embodiment of a jig is provided with the guide part 40 longer than the time of Embodiment 1. Therefore, the conversion board 2 is held a constant interval and horizontally to the lined surface 44a because the upper surface of the guide part 40 contacts the lined surface 44a of the 2nd jig 41 for alignment. Namely, this piece 46 for positioning fixes of a jig not only functions as a spacer between the conversion board 2 and the 1st jig 31 for alignment, but functions as a spacer between the conversion board 2 and the 2nd jig 41 for alignment.

[0046]The positioning fix of the jigs 31 and 41 for both alignment is carried out to separation impossible by the hook shape piece 47 of a positioning fix as a positioning fix mechanism. Even if this piece 47 of a positioning fix has few jigs 31 and 41 for both alignment, it is provided in either. Therefore, a gap of the jig 31 for both alignment and 41 comrades is prevented at the time of reversal. At the time of reversal, so to speak, conversion board 2 the very thing plays the role of a presser foot, and prevents omission of each male type pin 16. As a positioning fix mechanism, it is not limited to the above-mentioned hook structure, for example, the fitting/removing structure by unevenness, etc. may be adopted. The positioning fix mechanism may be formed in the 1st jig 31 side for alignment, may be formed in the 2nd jig 41 for alignment, and may be formed in both 31 and 41. These positioning fix mechanisms may be the jigs 31 and 41 for alignment, and a different body.

[0047]A double-sided package reflow is performed for the conversion board 2 by the jig 31 for alignment, and heating the whole 41 after such a reversal process, and melting of the cream solder 18 is carried out. As a result, the mold pin 16 which the 1st lets pass pad 5 is soldered, and the 2nd pad 4 and the negative-form socket-like pin 15 are soldered. Then, the desired conversion module 1 is completed by soldering the electronic parts 11 and 12 individually to each pad 9 and 10.

[0048]Now, in this embodiment, characteristic operation effects are enumerated below.

(b) It cannot be overemphasized that this embodiment does so each operation effect of I, RO, and Ha who stated by Embodiment 1 since as fundamental a portion as a 1st

embodiment is common.

[0049]According to this embodiment, the positioning fix of the jig 31 for both alignment and the 41 comrades is carried out to separation impossible by the piece 47 of a positioning fix which is a positioning fix mechanism further. Therefore, even when reversing the jigs 31 and 41 for both alignment in the state where made it counter and it has arranged, a gap of the jig 31 for both alignment and 41 comrades is prevented. Therefore, a double-sided package soldering process can be performed certainly. Therefore, improvement in working efficiency can be aimed at compared with the case where one side [every] soldering is performed. In order to make it align where the negative-form socket-like pin 15 is floated also about the 2nd jig 41 for alignment, there is an advantage that a perfect fillet is formed certainly, not only about the 1st field side but about the 2nd field side.

[0050]It is not limited to the above-mentioned embodiment, for example, this invention can be changed into the following gestalten.

O In the jig 51 for alignment of example of another shown in drawing 7, the piece 52 for positioning fixes of a jig which carried out shape which is different in the 1st jig 31 for alignment shown by Embodiment 1 is adopted. The conversion board 2 has fitted into the piece 52 for positioning fixes of a jig. Therefore, so to speak, this piece 52 of a jig has only a role of a guide at the time of fitting of the conversion board 2.

[0051]O Also in the jig 61 for alignment of example of another shown in drawing 8, the piece 62 for positioning fixes of a jig which carried out shape which is different in the 1st jig 31 for alignment shown by Embodiment 1 is adopted. The conversion board 2 is laid in the upper surface of the piece 62 for positioning fixes of a jig. Therefore, this piece 62 of a jig has only a role of a spacer for so to speak making between the conversion board 2 and the lined surfaces 33a into a constant interval.

[0052]O Even if soldering is not limited only to soldering which used the solder S1, for example, is soldering using silver solder etc., etc., it is easy to be natural [soldering].

O The male type pin 16 used in Embodiment 2 is not limited in the shape of a nail heading, for example, may carry out simple shape. However, it is more advantageous to improvement in reliability to be a nail heading-like as above-mentioned.

[0053]O The method of replacing with and carrying out an one side [every] reflow to the method of Embodiments 1 and 2 which solder a terminal by a double-sided package reflow may be adopted. In this case, as for the solder S1 for soldering performed previously, it is better than the solder S1 for soldering performed behind that it is a high-melting point.

[0054]O The manufacturing method using the jigs 31, 41, 51, and 61 of this invention may be applied to manufacture of the conversion modules 71, 73, 75, and 77 of structure as shown, for example in drawing 9 (a) - drawing 9 (d). In the conversion module 71 of drawing 9 (a), the nail heading-like male type pin 16 is soldered to the 1st pad 5, and the vamp 72 of the approximately ball state as a terminal is soldered to the 2nd pad 4. In the conversion module 73 of drawing 9 (b), the vamp 72 of approximately ball state is soldered to the 1st pad 5, and the negative-form socket-like pin 15 is soldered to the 2nd pad 4. In both the conversion modules 75 of drawing 9 (c), the male type pin 16 is soldered to the 1st pad 5 and 2nd pad 4. In both the conversion modules 77 of drawing 9 (d), the negative-form socket-like pin 15 is soldered to the 1st pad 5 and 2nd pad 4. If it is a case where it is supplied in the state where a terminal is scattering, the way of the manufacturing method using the two jigs 31 and 41 like Embodiment 2 is suitable for

manufacture of these conversion modules 71, 73, 75, and 77.

[0055]O The manufacturing methods using the jigs 31, 41, 51, and 61 of this invention are the conversion modules 1 and 71. -- It is easy to be natural even if applied to manufacture of substrates with a terminal other than 77.

O A bore may be formed in the piece 32 of a jig and 33 grades which replace with formation of the cave 36, for example, constitute the jigs 31, 41, 51, and 61 for alignment. Said piece 32 of a jig and 33 grades may be formed by a porous body. Even if it is these composition [like], it shall be easy to become hot and shall be easy to cool down. When choosing a small material of specific heat, cavernous 36 grade may be omitted.

[0056]Here, the technical ideas grasped by the embodiment mentioned above are enumerated below with the effect besides the technical idea indicated to the claim.

(1) It is a conversion module for performing signal transformation etc. in any 1 paragraph of claims 1 thru/or 3, when said substrate with a terminal carries a semiconductor package in a mother board, The jig for the substrate manufacture with a terminal, wherein said terminal is a pin like terminal and said soldering is soldering which used solder as said wax material.

[0057](2) In claims 1 thru/or 3 and any 1 paragraph of the technical idea 1, the connecting end of said terminal is a nail heading part of a pin like terminal, The jig for the substrate manufacture with a terminal where touch with said lined surface is lost the nail heading part only 0.6 mm - 5.0 mm (1.0 more mm - 3.0 mm, especially 1.5 mm - 2.0 mm), wherein it is held. A perfect fillet can be formed certainly, without making a pin like terminal produce a position gap as it is this composition.

[0058]The technical term used into this specification is defined as follows.

"Wax material : The thing of the low melting point of the solder of Pb loess, such as Handaya of a Pb-Sn system which contains lead and tin as the main ingredients like eutectic crystal solder, Au system, In system, and Bi system, etc. is said, and also the thing of high-melting points, such as silver solder, is included."

[0059]

[Effect of the Invention]As explained in full detail above, according to the invention given in claims 1, 2, and 3, the jig for the substrate manufacture with a terminal which can manufacture a reliable substrate with a terminal certainly can be provided.

[0060]According to the invention given in claims 2 and 3, since the time which the transfer operation of a jig becomes unnecessary and a soldering process takes can be shortened in addition to the above-mentioned effect, only the part can aim at improvement in working efficiency.

[0061]According to the invention according to claim 3, since it adds to the above-mentioned effect and a gap of both the jigs at the time of reversal is prevented, a double-sided package soldering process can be performed certainly, and improvement in working efficiency can be aimed at along with it.

[Brief Description of the Drawings]

[Drawing 1]The schematic diagram showing the condition of use of the conversion module of Embodiment 1 manufactured with the jig of this invention.

[Drawing 2]The schematic diagram showing the conversion module.

[Drawing 3]The important section expanded sectional view of the conversion module.

[Drawing 4](a) - (e) is an outline sectional view for explaining the manufacturing method of the conversion module which used the jig of Embodiment 1.

[Drawing 5]The conversion module and the important section expanded sectional view of a jig.

[Drawing 6](a) - (f) is an outline sectional view for explaining the manufacturing method of the conversion module of Embodiment 2 which uses two jigs.

[Drawing 7]The outline sectional view showing the jig for conversion module manufacture of example of another.

[Drawing 8]The outline sectional view showing the jig for conversion module manufacture of example of another.

[Drawing 9](a) - (d) is a schematic diagram showing the various conversion modules which can be manufactured with the jig of this invention.

[Drawing 10]The important section expanded sectional view for explaining the manufacturing method of the conversion module in the former.

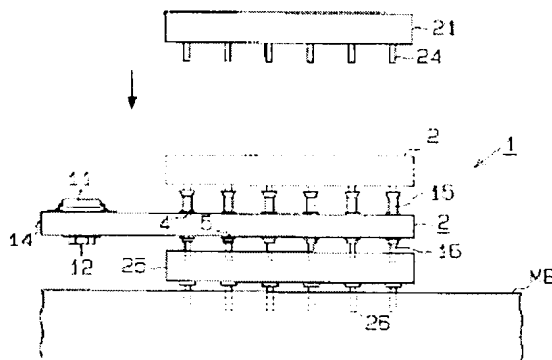
[Drawing 11]The important section expanded sectional view for explaining the manufacturing method of the conversion module in the former.

[Drawing 12]The important section expanded sectional view for explaining the manufacturing method of the conversion module in the former.

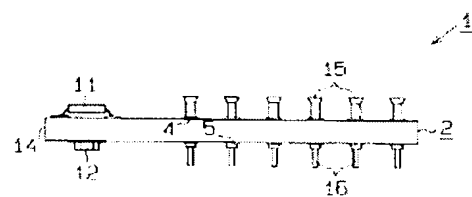
[Description of Notations]

1, 71, 73, 75, 77 -- The conversion module as a substrate with a terminal, 2 -- The conversion board as a substrate, 4, 5 -- The pad as a conductor part, 15 -- The negative-form socket-like pin as a terminal, 16 -- The male type pin as a terminal, 16a -- The nail heading part as a jointing end, 31, 41, 51, 61 [-- The piece of a positioning fix as a positioning fix mechanism, and L2 / -- The quantity (floating / = / quantity) and S1 in which a perfect fillet is formed and it deals -- Solder as wax material.] -- The jig for alignment as a jig for the substrate manufacture with a terminal, 33a, 44a -- A lined surface, 37, 45 -- A crevice, 47

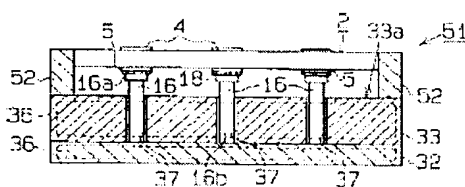
【図 1】



【図 2】



【図 7】



【図 8】

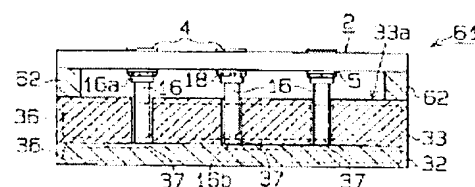
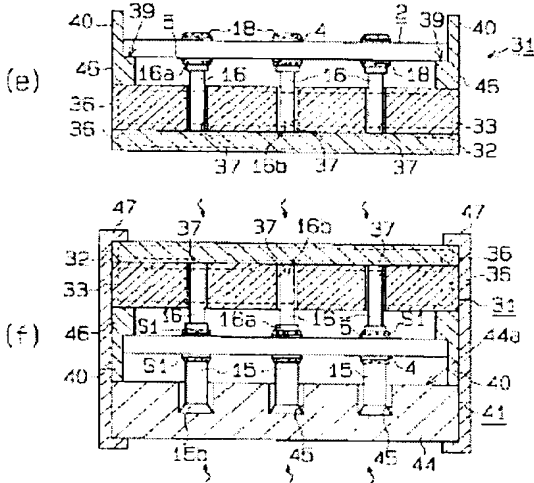


Fig. 1 consists of five cross-sectional views, labeled (a) through (e), illustrating different configurations of a semiconductor device. Each view shows a substrate with a central channel region (32) and side regions (33, 34). Various layers and structures are labeled with reference numerals:

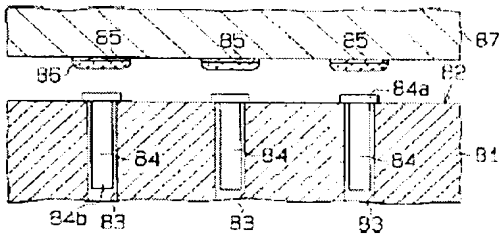
- (a)** Shows a substrate with a central channel region (32) and side regions (33, 34). A layer (36) is on top. Electrodes (16) are formed on the side regions (33, 34). A layer (38) is on top of the electrodes. A layer (31) is on top of the substrate.
- (b)** Shows a similar structure to (a), but with a different configuration of the electrodes (16) and the layer (38).
- (c)** Shows a similar structure to (a), but with a different configuration of the electrodes (16) and the layer (38).
- (d)** Shows a similar structure to (a), but with a different configuration of the electrodes (16) and the layer (38).
- (e)** Shows a similar structure to (a), but with a different configuration of the electrodes (16) and the layer (38).

Fig. 1 is a cross-sectional view of a semiconductor device. The device features a substrate 33 with a top layer 32. A central vertical layer L3 is flanked by layers L1 and L2. A horizontal layer 14(2) is at the top, with a gap 4 between it and the substrate. Various other layers and regions are labeled: 5, 17, 17a, 16a, 16, 16b, 33a, 37, 32, and 31. Dimensions D1, D2, D3, D4, and D5 are indicated for different widths.

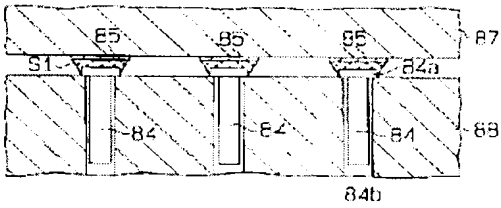
【图6】



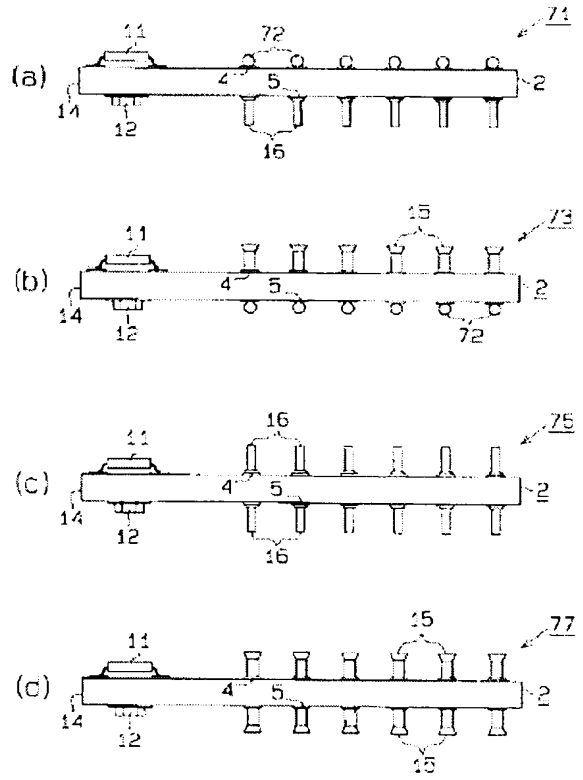
【例 10】



【例 12】



【29】



【 1 1】

